

BSPPS Forum:

*What can I do with a
major in the
pharmaceutical
sciences?*



**COLLEGE OF PHARMACY AND
PHARMACEUTICAL SCIENCES**

THE UNIVERSITY OF TOLEDO



BSPS MAJORS @ UT

- © Cosmetic Science & Formulation Design
- © Medicinal and Biological Chemistry
- © Pharmaceutics
- © Pharmacology/Toxicology
- © Pharmacy Administration



BSPS Program Website

COLLEGE OF PHARMACY & PHARMACEUTICAL SCIENCES

- CPPS HOME
- ABOUT THE COLLEGE
- ACADEMIC PROGRAMS
- RESEARCH & FACULTY
- ALUMNI & GIVING
- PHARMACY SUMMER CAMP
- CONTACT US

WELCOME

- Current Students
- Prospective Students
- Offices and Departments
- Centers

RESOURCES AND LINKS

- Assessment
- Blackboard/WebCT Login
- Bully Incident Report
- College Catalog
- Commencement
- Computing
- Drug Information Res
- Experiential Education
- Honors Program
- Information Technolo
- Library/Learning Resources

B.S. IN PHARMACEUTICAL SCIENCES PROGRAM

The Bachelor of Science in Pharmaceutical Sciences (BSPS) degree is a four-year baccalaureate program that includes a required internship. The pharmaceutical sciences represent the collective basic sciences that underlie pharmacy. This degree program is designed for students who wish to attend medical school or pursue careers related to the pharmaceutical industry, pharmaceutical science and research, pharmacy administration and sales, the biomedical industry, forensic science, and health care administration. It also prepares students to enter law school or pursue graduate studies. There are five majors in this degree program:

- Cosmetic Science and Formulation Design (PHCS)
- Medicinal and Biological Chemistry (MBC)
- Pharmaceutics (PHAR)
- Pharmacology/Toxicology (PTOX)
- Pharmacy Administration (PHAM)

BSPS PROGRAM

- B.S. in Pharmaceutical Sciences Program
- Pharmaceutical Science Pre
- Cosmetic Science and Formulation Design major
- Medicinal and Biological Chemistry major
- Pharmaceutics major
- Pharmacology/Toxicology major
- Pharmacy Administration major
- Student Learning Outcomes
- Admission to BSPS Program
- BSPS Internship
- BSPS Alumni Profiles
- Downloadable BSPS Brochure
- Contact Us
- Apply today!

Check out the details on each major:

http://www.utoledo.edu/pharmacy/academic_programs/bspharmsciprograms/

in high demand because of their unique training and preparation



What Can I Do ...?

What Can I Do with a Major in **Pharmaceutics?**

As a specialist in pharmaceutics, you will aid in developing, manufacturing, and evaluating products such as tablets, capsules, ointments, and liquids for medicinal, nutritional, and cosmetic use. Pharmaceutics majors are prepared for careers in:

- Research
- Drug delivery
- Product development/formulation
- Production/manufacturing
- Quality control/quality assurance
- Packaging
- Drug stability testing
- Regulatory affairs

Pharmaceutics majors are also prepared to pursue M.S. or Ph.D. degrees in pharmaceutics, as well as to enter medical/osteopathic, dental, M.B.A., or law programs.

A Sample of Related Career Opportunities:

What Can I Do with a Major in **Pharmacy Administration?**

Pharmacy Administration focuses on the business of pharmacy healthcare. Students are prepared in the foundational sciences of pharmacy, including pharmacology and medicinal chemistry, in addition to anatomy and physiology, chemistry, biology, physics, and calculus. The curriculum in the junior and senior years of the program focuses on the healthcare landscape and the business of healthcare.

Pharmacy Administration majors are prepared to pursue graduate coursework toward the MBA degree. The curriculum includes business classes including:

- economics
- management
- marketing and sales
- finance
- business law
- accounting
- organizational behavior
- analytics

Pharmacy Administration majors are also prepared to pursue graduate coursework toward the MBA degree. The curriculum includes business classes including:

A Sample of Related Career Opportunities:

- Sales Representative
- Pharmaceutical Marketing
- Store Manager, Retail
- Manager
- Data Analyst
- Hospital/Health System

Types of Employers:

Private Organizations

- Pharmaceutical Companies
- Medical Device Companies
- Medical Suppliers
- Managed Care Organizations

Government Agencies

- U.S. Public Health Service

- Pharmaceutical
- Insurance
- Chain
- General

- National

What Can I Do with a Major in **Cosmetic Science & Formulation Design?**

As a specialist in Cosmetic Science & Formulation Design, you will aid in developing, manufacturing, and evaluating cosmetics and personal care products such as lipstick, eye shadow, shampoo, hair coloring and other products for adults, children, babies and infants. Cosmetic Science & Formulation Design majors are prepared for careers in:

- Pharmaceutical Sales/Marketing
- Chemical or Cosmetic Ingredient Manufacturer: Research/Sales/Marketing
- Consumer Safety Officer
- Drug Analyst
- Personal Care Product Formulator
- Regulatory Affairs Specialist
- Manufacturing/Production Technologist
- Nutritional Formulations Personnel
- Flavor Specialist: Flavor

What Can I Do with a Major in **Pharmacology and Toxicology?**

Pharmacology and Toxicology graduates pursue careers in the pharmaceutical and chemical industries, and at universities, research institutes, and state, local and federal governmental agencies. Pharmacologists, emphasizing the mechanisms by which drugs act, draw on the disciplines of physiology, pathology, biochemistry, biology, and microbiology to examine the actions of chemicals on living organisms. Toxicologists are engaged in the investigation of poisons, or toxins, from the standpoint of detection, isolation, identification, and determination of their effects on the human body.

Pharmacologists and toxicologists work together as part of a multidisciplinary team, which may include synthetic chemists, cell and molecular biologists, clinicians, and

What Can I Do with a Major in **Medicinal and Biological Chemistry?**

Medicinal and Biological Chemistry (MBC) is an interdisciplinary science with areas of focus in synthetic organic chemistry, biochemistry, molecular biology, biotechnology, pharmacology, and pharmaceutical chemistry underlying the design, synthesis and development of drugs. The MBC major offers an entry to applied research in rational drug design and provides training in science research for the development of new drugs and therapeutics.

Graduates from this major will be ideal for careers in pharmaceuticals, biotechnology, and chemical industries. Graduates also allows students to compete for positions in the petrochemical, wine, and food industries. Graduates are also able to move on to graduate programs in chemistry, biology, and medicine.

Which majors would you like to explore? Email your selection to BSPSOffice@utoledo.edu for a copy of these handouts.

- Hospitals/Medical Centers
- Research Organizations
- Research Foundations



PHARMACEUTICAL SCIENCES: THE RIGHT CAREER FOR ME?

- ⦿ Do you enjoy science and want to pursue a science-based career?
- ⦿ Do you like to work hands-on in a laboratory setting?
- ⦿ Do you have a desire to contribute to the health and well-being of society through the development of medicines and therapies?

*If so, a career in pharmaceutical sciences
may be a good choice for you!*



PHARMACEUTICAL SCIENTISTS

Pharmaceutical scientists are typically involved in the **discovery**, **development** and **delivery** of drugs as well as the pharmacoeconomics and related regulatory activities.

They spend most of their time doing research in a laboratory or office setting.

BSPS Cosmetic Science and Formulation Design Degree

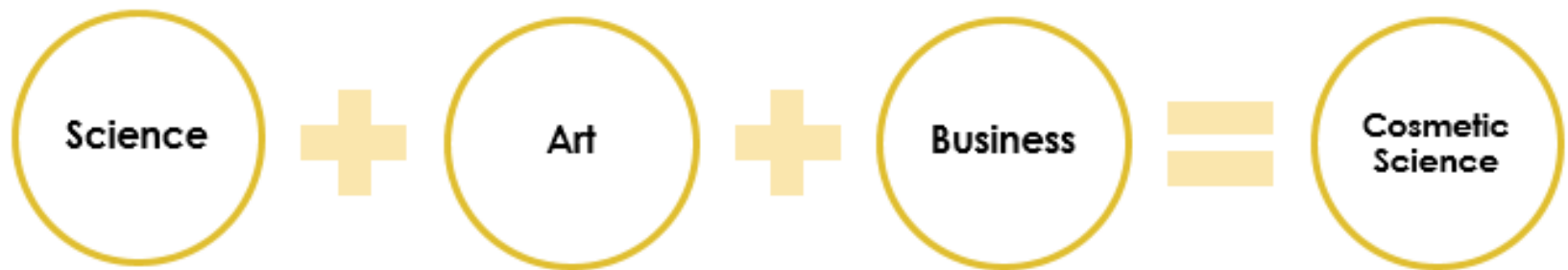
DR. GABRIELLA BAKI

COLLEGE OF PHARMACY AND PHARMACEUTICAL SCIENCES
THE UNIVERSITY OF TOLEDO



BSPS Cosmetic Science and Formulation Design

- Not cosmetology!
- 4-year science-based program
- First and *only* undergraduate program in the US

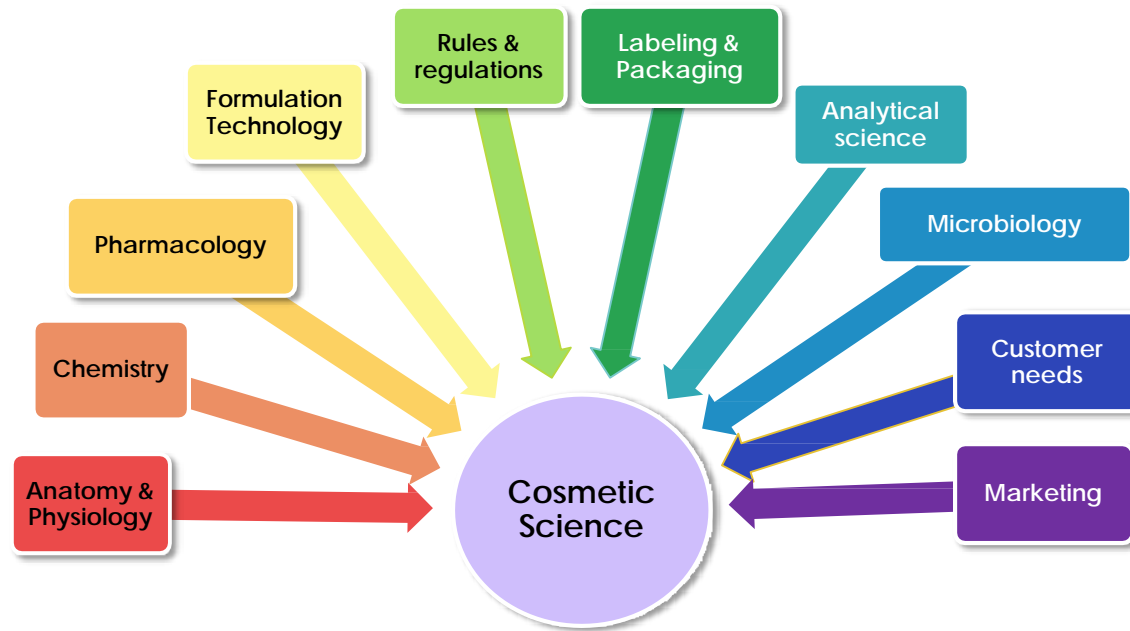


Focus of the Major

Makeup products and personal care products



What Is Cosmetic Science?



Unique Features

US Cosmetic Industry

- ▶ **Recession-proof:** increased sales during recession!
- ▶ 2016: **most valuable** beauty and personal care market in the world
- ▶ **Skin care** products make up largest part of the market (36.4%)
- ▶ **In need** of well-trained scientists

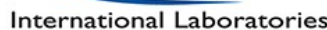
BSPS Cosmetic Science and Formulation Design

- ▶ Science, business and art classes
- ▶ Typical **business minors:** sales and marketing
- ▶ Intensive product **formulation** training and hands-on experience
- ▶ **Guest speakers** from the industry

Companies Hiring Graduates



JRIA'S RET Bath&BodyWorks PINK La Senza HENRI BENDEL NEW YORK

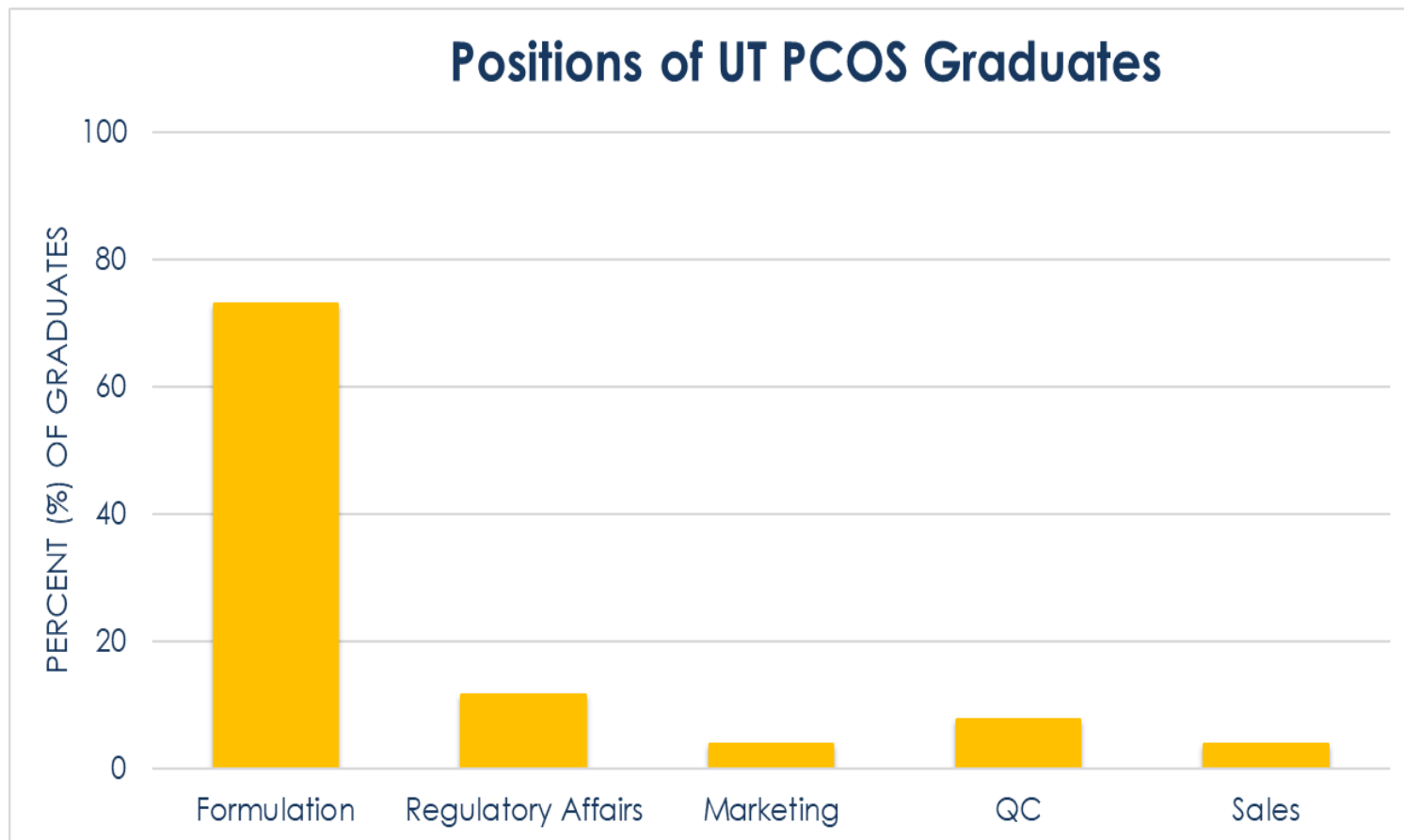


Common Job Titles

- ▶ Cosmetic chemist = Formulation chemist
- ▶ Quality control specialist
- ▶ Technical marketing manager
- ▶ Technical sales personnel
- ▶ Product performance evaluator
- ▶ Safety testing personnel
- ▶ Regulatory specialist
- ▶ Supply chain management specialist



Positions of UT Graduates



More Information

- ▶ Useful links:
 - ▶ [BSPS Cosmetic Science and Formulation Design](#)
 - ▶ [Cosmetic Science and Formulation Design degree at UT](#)
- ▶ YouTube Videos:
 - ▶ [Making Makeup](#)
 - ▶ [I love my major](#)
 - ▶ [Cosmetic Science at UT](#)



Medicinal and Biological Chemistry

Training in science research for the
development of new drugs and therapeutics

Medicinal Chemistry:

chemistry, biochemistry and biotechnology
applied to drug design



MBC Major

- **Theme is rational drug design**
- **Good choice for someone who likes**
 - Chemistry, biochemistry, molecular life science, or immunology
 - Laboratory work
 - Research
- **Program requirements**
 - Advanced laboratory (3 cr. hrs wit more recommended)
 - Additional elective courses and practical laboratory experiences (22 cr. hrs) in advanced physical science and life science
 - Year 4: Capstone courses in Targeted Drug Design (3 cr. hrs.)
 - 22 semester hours of professional elective
- **Opportunity for undergraduate research**

Preparation for Lab Work

Theory and Practice



- Overall Emphasis on Development of Laboratory Skills:
 - chemical synthesis, characterization and chemical analysis
 - capacity to handle and analyze biological materials (cells and receptor preparations) that are important in drug characterization.
- Emphasis on learning by doing—ideally you start out under close supervision ...finish working relatively independently

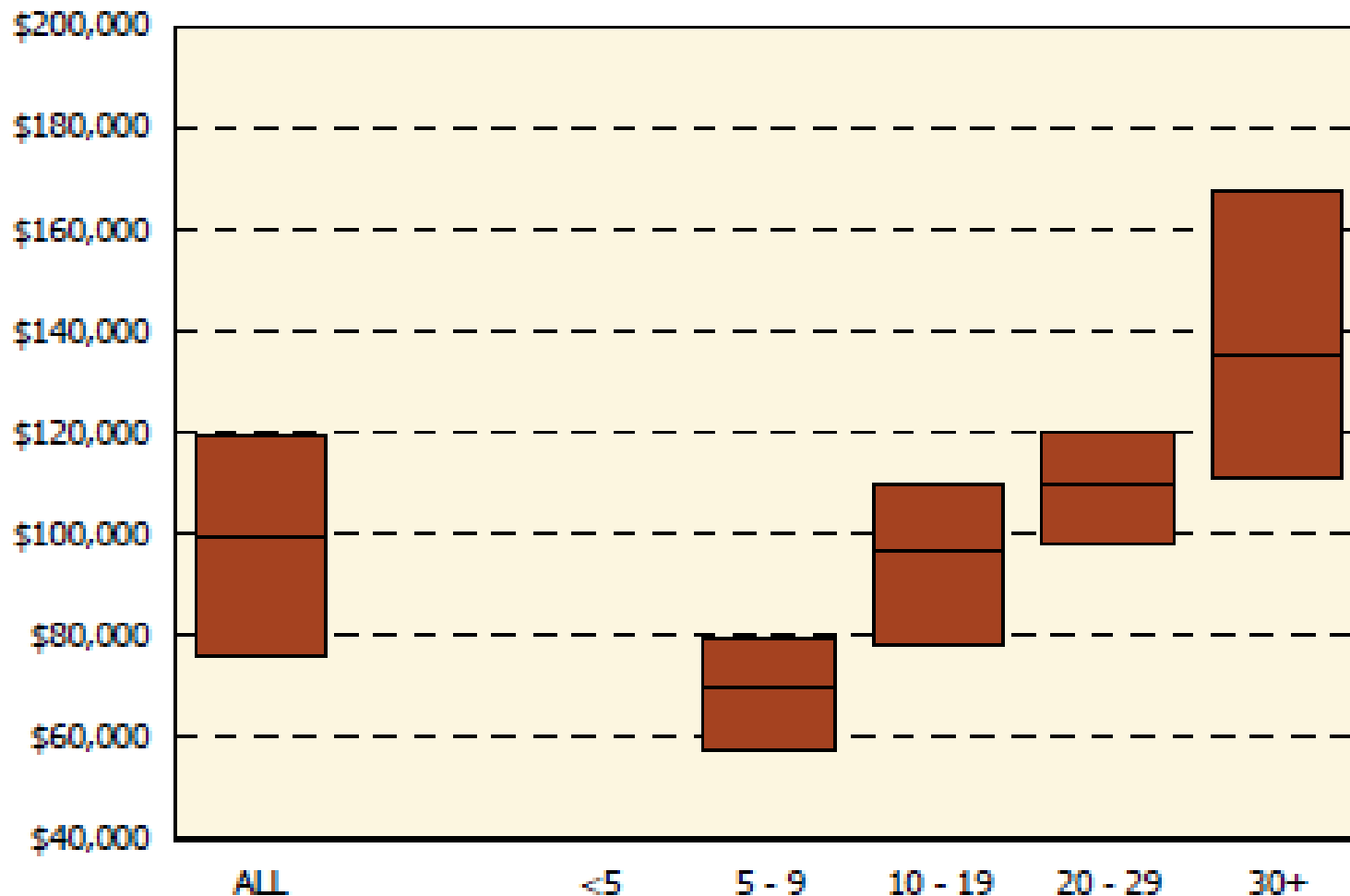
- What do you do with the degree? What will my life be like? Who is going to pay me to do this kind of work and how much?
 - Work in industry or in government or a foundation lab as a technical assistant.
 - You will function as a junior member of a drug design team, but usually with a supervisor who works along side you.
- You can go on for further training and obtain master's degree (1-2 additional years) or doctorate (4-6 additional years).
 - Excellent preparation for **medical or dental school**, where exposure to research is valued (evidence based practice)

What are the Rewards?

- Salary and compensation
- Job Satisfaction-doing something difficult that is important
 - Responsibility
 - Professional Advancement
 - Opportunity to contribute
 - Genuinely interesting work that is always new
 - Access to a health care professional program

US Base Annual Salary By Experience And Education

Education = BS



base: 148 reporting US full-time employees with BS

Exhibit 2.34

US Base Annual Salary By Education



base: 1044 reporting US full-time employees

AAPS 2011 Salary Survey



The MBC major offers an entry to applied research in rational drug design



PHARMACEUTICS

DR. JERRY NESAMONY



PHARMACEUTICS

Pharmaceutics is a multidisciplinary applied science which studies the physical and chemical attributes of drugs. It places a strong emphasis on the design and evaluation of drug delivery systems and dosage forms and on the understanding and control of the factors influencing clinical response to drug therapy.

Career Opportunities: Students are prepared for a wide range of career opportunities as drug analysts, manufacturing/production technologists, quality control inspectors, technical writers, sales representatives, and research associates in the pharmaceutical industry and in government. Graduates can also move on to graduate studies in the field, medical school, or other professional school.



JERRY NESAMONY, PH.D.



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PHARMACOLOGY/TOXICOLOGY

DR. MING LIU



PHARMACOLOGY/TOXICOLOGY

Pharmacology and Toxicology are biomedical sciences which focus on how to develop safe, effective drugs and prevent the harmful effects of chemicals.

Pharmacology focuses on the way drugs interact with various living systems that includes the properties, effects, and mechanisms of drug action.

Toxicology focuses on the interaction of toxic compounds in the body that includes exposure assessment, dose response assessment, and hazard identification.



PHARMACOLOGY/TOXICOLOGY

Career Opportunities: It prepares students to work as a pharmacologist and toxicologist in the biomedical industry, pharmaceutical industry, nutritional industries, environmental conservation and pollution control, scientific civil service, governmental agencies, forensic sciences, and research institutes.



Ming-Cheh Liu, Ph.D.



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PHARMACY ADMINISTRATION

DR. VARUN VAIDYA



PHARMACY ADMINISTRATION

Pharmacy Administration focuses on the outcomes and business aspects of pharmacy and healthcare in general. The curriculum focuses on the healthcare landscape and the business of healthcare, along with foundational health systems courses and business classes.

Career Opportunities: Graduates are employed by community pharmacies as regional/division managers, by hospitals, health systems, by pharmaceutical and medical device companies or as division heads at various federal and state organizations.



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INTERNSHIP

- ① An internship is required in all BSPS majors; our internship office works closely with you to secure an internship
- ① Students work on campus, around the country, and at our international partner sites



RESEARCH

- © Joining a research team as a first- or second- year PRE-Professional student is ***strongly*** recommended for all majors
- © Summer funding may be available through the [Office of Undergraduate Research](#)
- © Contact us to find out about current research openings

Summer Research in the Pharmaceutical Sciences

Wed., Nov. 7, 2018 5:00 – 6:30 pm

Main Campus - Wolfe Hall 1240

- ❖ Money for summer research
- ❖ Meet BSPS Faculty
- ❖ Free Pizza!



Let us know by 11/5
if you are attending:
BSPSOffice@utoledo.edu



CONTACT THE MAJOR COORDINATORS:

Cosmetic Science and Formulation Design (PCOS) Major: *Program Coordinator* – Dr. Gabriella Baki, Wolfe Center 114-F, 419-383-1973, gabriella.baki@utoledo.edu

Medicinal & Biological Chemistry (MBC) Major: *Program Coordinator* & *BSPS Program Director* – Dr. Jim Slama, Wolfe Center 274-E, 419-383-1925, james.slama@utoledo.edu



Pharmacology/Toxicology (PTOX) Major: *Program Coordinator* – Dr. Ming Liu, Wolfe Center 284-C, 419-383-1918, ming.liu@utoledo.edu

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Pharmacy Administration (PHAM) Major: *Program Coordinator* – Dr. Varun Vaidya, Wolfe Center 115-D, 419-383-1516, varun.vaidya@utoledo.edu



ADDITIONAL QUESTIONS?

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**College of Pharmacy &
Pharmaceutical Sciences**

**Frederic & Mary Wolfe
Center, on UT's Health
Science Campus**